Abstract

A series of bulk-size magnetic/insulating nanostructured composite soft magnetic materials with significantly reduced core loss and its manufacturing technology. This insulator coated magnetic nanostructured composite is comprises a magnetic constituent, which contains one or more magnetic components, and an insulating constituent. The magnetic constituent is nanometer scale particles (1–100 nm) coated by a thin-layered insulating phase (continuous phase). While the intergrain interaction between the immediate neighboring magnetic nanoparticles separated by the insulating phase (or coupled nanoparticles) provide the desired soft magnetic properties, the insulating material provides the much demanded high resistivity which significantly reduces the eddy current loss. The resulting material is a high performance magnetic nanostructured composite with reduced core loss.